UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 5

COMPLIANCE EVALUATION INSPECTION

Facility: United States Steel Corporation
Minnesota Ore Operations (Minntac)
8819 Old Highway 169
Mountain Iron, Minnesota 55768

NPDES Permit Numbers:

MN0052493 (Mining Area, expired November 20, 2008)
MN0057207 (Tailing Basin, expired July 31, 1992)

Purpose: To verify compliance with applicable regulations under the Clean Water Act (CWA), specifically with its National Pollutant Discharge Elimination System (NPDES) permit related to its tailing basin area and mining operations.

Date of Inspection: May 21 – 23, 2012

EPA Representatives:

- Noel Vargas (Lead Inspector), Environmental Engineer, 312-353-3575
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Minnesota Pollution Control Agency (MPCA):

- John Thomas, Senior Pollution Control Specialist – Duluth Office, 218-302-6616

Facility Representatives:

- Chrissy Bartovich, Director-Environmental, 218-749-7364
- Tom Moe, Environmental Control Engineer, 218-749-7485
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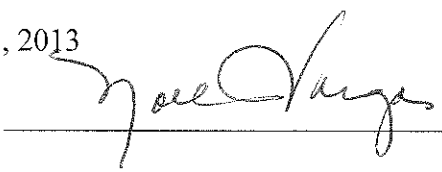
Report Date: May 9, 2013

Inspector Signature 

BACKGROUND

Minntac is a taconite mining and processing facility located in Mountain Iron, St. Louis County, Minnesota. The mine is located at the Mosabi Iron Range region in northern Minnesota, a major production area. This region is home for several Indian reservations, and also part of Lake Superior Basin. Taconite processing at Minntac facility produces iron (Fe) pellets, used in the steel making industry. Minntac has been operating at this location for over 40 years. At the maximum operating rate, Minntac generates 16.5 million tons of taconite pellets per year. United States Steel Corporation (US Steel) headquarters is located in Pittsburg, Pennsylvania.

The Minntac facility includes an open-pit taconite mine (east and west pits) and a facilities areas where the processing plant operates crushers, the concentrator, the agglomerator, and associated air and water pollution control systems, among other things. The facility also includes a 7900-acre tailing basin, the final disposal area for the fine and coarse tailings generated during the processing of taconite. Coarse tailings in particular are used for road maintenance through the facility and for construction. The tailing basin also serves as a slurry impoundment and storage area for the wastewaters discharged from the facility. Minntac refers to the impoundment as the clear pool area. It occupies 1400 acres and is composed of two cells (named Cell 1 and Cell 2).

Wastewaters are generated from both mining and processing operations. Discharges from the open-pit mines go through Outfalls SD001[1], 003, and 004 and these outfalls discharge to ditches tributary to the East Two River, the West Two River, Kinney Creek, and Parkville Creek (See Attachment 1). Other listed outfalls are considered inactive. Wastewaters that are not discharged go into an onsite reservoir for make-up water.

Discharges from the processing area are conveyed into the tailing basin, located north of the processing plant. West of the tailing basin, water is discharged into the Dark River through Outfall SD001 (formerly Seep 020). Dark River is impaired for mercury (Hg). East of the tailing basin, seepage points at the perimeter dike discharge into the Sandy River through Outfall SD002 (formerly Seep 030), according to the NPDES permit. Attachment 1 also shows locations of these outfalls. Sandy River is impaired for Hg. Monthly discharges from these outfalls vary from 0.10 to 0.23 millions of gallons per day (MGD), average.

Wastewaters from the processing area are generated mostly from the concentrator, agglomerator, and from the wet scrubbers. There are five wet scrubbers, each one associated with a taconite induring furnace line (grate kiln) in the agglomerator. In the kilns, the iron pellets are chemically converted into Fe_2O_3 through an exothermic/oxidation-reduction reaction. Sulfur dioxide (SO_2), an air pollutant, is also produced. These scrubbers were designed to control particulate matter (PM), another air pollutant. However, addition of lime or limestone into these scrubbers can also offer the benefit of increasing SO_2 removal efficiency. In the scrubbers, SO_2 is chemically converted into sulfates that end up in the wet scrubber blowdown as wastewater. Sulfates are non-conventional water pollutants, and high concentration of sulfates in the receiving waters affects the growth of wild rice, an important food source and a culturally-important component of tribal life. Water quality standards for sulfates and other water pollutants have been established for Class 4A waters that are used to grow wild rice. For sulfates, the standard is 10 mg/L. This standard was established in Minnesota in the 1940s. The University of Minnesota-

[1] SD001 is also used to identify outfall from tailing basin to Dark River.

Duluth (UMD) is conducting research to determine how much sulfate would have a detrimental effect on wild rice. This study is expected to be concluded by 2014. The MPCA will decide a new sulfate standard based on the results of this research. Discharge monitoring report (DMR) data shows reported discharges with sulfate concentrations ranging from 692 – 1320 mg/L for at least the last three years (See Attachment 2).

One of the wet scrubbers (Line 3 scrubber) is a recirculation scrubber, which uses and reuses process wastewater from the tailing basin. Sulfates previously formed during crushing of the ore and slurried at the concentrator are present in the make-up water for this line. For this reason, Line 3 scrubber generates the highest concentration of sulfates in the wastewaters. A separate wastewater treatment system (WWTS) is in place for this line. The WWTS includes a scrubber water recirculation tank, an equalization/precipitation tank, primary stage thickener, scrubber solids settling/storage pond, a slurry mix tank, and a Step I reclaim system. Construction of this scrubber commenced in November 2005, and was in full operation the following year. According to Minntac, the purpose of the scrubber was to comply with new air regulations intended to reduce PM emissions. Minntac also stated that the WWTS is in place to comply with the "no-net-increase" requirement for sulfate and hardness, in Chapter 4 of the tailing basin NPDES permit. Installation of the scrubber resulted in an increase of water pollutants. Minntac did not apply for a permit application or modification prior to its installation. The other wet scrubbers are once-through scrubbers whose effluents are discharged into the tailing basin.

In 2010, a survey and monitoring study was conducted for the Sandy Lake and Little Sandy Lake (locally known as Twin Lakes). These lakes are tributaries to the Sandy River. This survey was conducted under the agreement between the Bois Forte Band of Chippewa and US Steel – Minntac. The survey also monitored sulfate levels at certain points downstream of Sandy River, among other things. The same year, Minntac initiated construction of a seep collection and return (SC&R) system to eliminate Outfall SD002. The SC&R consists of ten catch basins located in each of the identified seepage points, each one conveying discharges into a pump station capable of returning collected seepage back to the tailing basin. According to Minntac, the SC&R collects and returns seeps at a rate of 600 gallons/min. The SC&R was in operation by June 2011.

On August 10, 2011, the EPA issued a Clean Water Act Section 308 Request for Information (RFI) to Minntac to obtain permitting and compliance information (See Attachment 3). All responsive documents were provided to EPA and reviewed prior to the inspection. The permitting history is tabulated, as follows:

Permit # MN0052493 – Mining Area (See Attachment 4)	
Date	History
12/7/1989	1982 NPDES Permit became effective.
7/31/1994	Permit expired.
12/18/1996	Permit reissued.
5/31/2001	Minntac submitted an application for renewal and modification of the NDPDES permit.
11/30/2001	Permit expired.
1/7/2004	Permit reissued.
8/2006	Minntac submitted a permit application to initiate a water management system

	(WMS) as part of the NPDES application for reissuance.
11/30/2008	Permit expired.
12/28/2011	Minntac submitted a permit application for reissuance.

Permit # MN0057207 – Tailing Basin (See Attachment 5)	
Date	History
9/30/1987	Final NPDES Permit issued.
2/23/1989	Permit modified.
1/31/1992	Minntac submitted a NPDES permit renewal application to MPCA.
7/31/1992	Permit expired.
4/23/2001	Minntac requested a variance for sulfates and other water pollutants (chlorine, hardness, and conductivity)
6/19/2001	MPCA responded to Minntac's requested variance.
12/22/2005	Minntac applied for permit modification to include "no-net-increase" requirement for sulfates and hardness.
4/21/2006	Permit modified to authorize installation of a recirculating line 3 scrubber. The permit authorized operation of the system to collect precipitated calcium sulfate solid and pump it into a scrubber solids holding basin.
8/2006	Minntac submitted a permit application to initiate a water management system (WMS) as part of the NPDES application for reissuance.
9/13/2007	Permit modified to authorize a change to the previous permit for monitoring a wastestream from the scrubber solid treatment system.
1/7/2010	Minntac applied for permit modification to install the SC&R.
4/13/2010	Permit modified.
12/28/2011	Minntac submitted a permit application for reissuance.

From information provided as response to the August 2011 RFI, the MPCA, and from the inspection, Minntac's compliance history with MPCA is summarized, as follows:

Date	History
May 1991	Stipulation agreement with MPCA to install Line 4 and Line 5 wet scrubbers.
8/21/2000	Letter of warning (LOW) from the MPCA was issued to Minntac for alleged violations of the CWA and State Rules at the Minntac tailing basin. The LOW was issued for exceedances of sulfate and specific conductance. These exceedances were reported in the discharge monitoring reports (DMRs).
12/6/2001	Schedule of Compliance (SOC)[2] entered with MPCA to develop information on tailing basin discharges.
9/18/2003	MPCA conducted a compliance inspection.
10/31/2003	December 2001 SOC amended to include evaluation of alternative mitigation goals for sulfate reduction technologies. Such technology would reduce sulfate levels to 646 mg/L at Outfall SD001, and to 486 mg/L at Outfall SD002 by December 2011.
12/21/2004	MPCA conducted a compliance inspection.

[2] A SOC is a term used by the MPCA to refer to an enforcement agreement to conduct corrective actions; that is not to be confused with a SOC used as a NPDES Permit provision to achieve compliance within a permit cycle.

2/13/2006	SOC entered with MPCA to submit plans and specifications for the air emission control equipment/WWTS by no later than 3/1/2006. This SOC also listed NPDES permit violations.
4/18/2006	SOC entered with MPCA to establish a schedule and submit a revised permit application and variance request to develop an appropriate NPDES permit for the facility.
5/1/2006	MPCA approved final plans and specifications to construct the WWTS for line 3 scrubber. According to Minntac, the system was designed to achieve a "no net increase" in mass loading of sulfate and hardness to the tailing basin on an annual basis.
7/27/2006	MPCA approved the water balance study that was conducted on the new 2.6 acre storage pond at the Minntac facility. The storage pond would be used to store the solids generated from line 3 scrubber blowdown WWTS. With this storage pond, the MPCA considered the WWTS fully operational.
8/16/2006	MPCA conducted a compliance inspection.
11/14/2007	SOC entered with MPCA to address tribal concerns. The SOC required that Minntac conduct a feasibility study to evaluate the reduction of seepage entering the Sandy River Watershed from the east tailing basin. SC&R system was considered, which would eliminate surface and shallow groundwater seepage discharges to the Sand River Watershed, ultimately eliminating Outfall SD002. The SOC was amended in 2/25/2010.
3/25/2008	MPCA conducted a compliance inspection.
9/8/2008	Stipulated Agreement entered between MPCA and US Steel – Minntac to settle issues associated with the February 2006 SOC.
2/25/2010	November 2007 SOC was amended to provide regulatory framework and schedule for construction and operation of the tailing basin SC&R earlier than required by the November 2007 SOC.
8/3/2010	MPCA conducted a compliance inspection.
6/9/2011	SOC for feasibility of the SC&R at the west perimeter dike. Also for alternative process makeup water from Sump #6 (considered best quality water, according to Minntac).
11/15/2011	MPCA conducted a compliance inspection.
3/9/2012	MPCA issued an Administrative Penalty Order (APO) to Minntac for violations of the NPDES permit.

SITE INSPECTION

About 8:40 a.m., on Monday, May 21, 2012, the EPA team (we) arrived at the US Steel, Minntac facility. We registered at the Pass Control office, where we read and signed a Register for Visitors and Hazard Training Program forms. A visitor's pass was provided to all inspectors. We proceeded to meet facility representatives at the Administration building.

EPA showed credentials and exchanged business cards prior to the opening conference. A sign-in sheet was also prepared. Mr. Tom Moe was not present during the first day of the inspection. EPA stated the purpose and scope of the inspection. Minntac continued by providing a brief description of the process taking place at this facility. Ms. Bartovich provided such description.

Most of the description was about the processing plant from the moment the ore is crushed until it turns into taconite pellets. As part of this description, Minntac mentioned its intention to install dry scrubbing systems, starting with line 6. The dry scrubbing system is US Steel's idea to implement a multimedia, multi-pollutant approach to compliance. It would consist of a gas suspension absorber with lime slurry injection for the control of sulfate oxides, activated carbon injection for the control of Hg, and dry electrostatic precipitator for PM.

About 10:05 a.m., both the EPA and Minntac (inspection team) were en route to the west pit viewing area (Pictures 1 - 4). Mr. Frank Pezzutto, Geologist, was in that area and provided a description of the blasting process taking place at the mine. An opportunity to witness a blasting was provided to EPA right before breaking for lunch (about 11:45 am). Meanwhile, after Mr. Pezzutto's presentation, the inspection team proceeded to the crushers and the concentrator. The team stopped by where the crude ore primary crushing operation takes place. There is a three-step crushing process. The entire process is dry.

Mr. Scott R. Vagle, Division Manager for the Crusher and Concentrator, accompanied the inspection team throughout the concentrator (Pictures 5 - 6). According to Mr. Vagle, the concentrator consists of a variety of mills (rod and ball) that further grinds the crude ore into a finer consistency. Hydrocyclones use water for dust emission control, while magnetic separators are used to separate the magnetic iron from the slurried waste material (tailings). The floatation process is the last step, where flocculants and other chemicals like amines are added to the iron concentrate, reducing also the amount of silica in the final pellet product.

About 1:30 p.m., the inspection team reconvened at the concentrator, where the hydroseparators and the thickeners were located. These dewatering units were continuously decanting wastewater overflows back to the process, while the underflow slurry was conveyed into the tailing basin (Pictures 7 - 12). At 2:15 p.m., the inspection team continued through the agglomerator building and observed the feed preparation area and the induring area. At the feed preparation area, ground limestone and dolomite are added to the iron concentrate and then dewatered by disc filters. The filter cake is then mixed with bentonite and formed into greenballs in balling drums. The greenballs are then dried, heated, and fired in a grate kiln, where pellets are formed (the induring process). The pellets are then cooled, stock piled, and loaded into the pellet trains. Mr. Brad Gerlack, Operations Coordinator, accompanied the inspection team throughout these processes. Wastewaters generated at this plant are also recycled. Pictures 13 – 16 were taken from the agglomerator building and show a view to the loading area and the tailing basin.

About 3:05 p.m., the inspection team visited the onsite sanitary sewage treatment area. Mr. Paul Smith, Utilities Coordinator provided us with a description of the process. This system consists of air activated sludge with internal clarifier (Pictures 17 - 19). Disinfection is done with sodium hypochlorite solution. The effluent is measured and discharged to the tailing basin. The inspection ended around 4:30 p.m.

On Tuesday, May 22nd, the inspection team met about 8:45 a.m. Since Mr. Tom Moe was present, the EPA was able to get a thorough and more specific overview of all water related processes in both the mine and the processing area. About 9:43 a.m., the inspection team was

en route to the agglomerator plant, this time to see the wet scrubbers and the WWTS. Mr. Gerlack joined the inspection team. There are five wet scrubbers at the facility, namely lines 3, 4, 5, 6, and 7. We observed the operation of Line 3 scrubber and the wastewater blowdown treatment (the WWTS), as shown in Pictures 20 - 24.

At 10:15 a.m., the inspection team was en route to the tailing basin. On the way there, we stopped briefly at the line 3 solid holding ponds (Picture 25). Water from this pond is sent to the WWTS. We also stopped at the discharge point of the composite flow from the concentrator thickeners (Pictures 26 – 27). This flows goes directly into the tailing basin, and it is not measured at this point. The inspection team drove around the east of the tailing basin, and observed most of the seepage catch basins (Pictures 28 - 30). We also observed the pump station area, and the headwaters of Sandy River. There was an inlet located where Outfall SD002 used to be. A sheet pile separates this location from the headwaters of Sandy River. At the time of the inspection, water was flowing from the rock berm into the inlet (Pictures 31 – 35). We continued west (Pictures 36 – 38), and observed the area where Outfall SD001 is located (Picture 39 - 44). The discharge into the Dark River headwaters was flowing steadily.

During the afternoon, the inspection team observed the mine pits. Discharge from the mining area is primarily for mine pit dewatering to provide access to taconite ore. Some mine pit dewatering flow is pumped up to the onsite reservoir to be used at the processing plants as makeup water. Due to weather conditions, only a few discharge outfalls were observed. Such outfalls were SD001 (Sump #3); SD003 (Sump #6); and SD004 (Prindle Sump) (Pictures 45 - 54). About 5:30 p.m., the inspection ended for the day.

On Wednesday, May 23rd, at 9:05 a.m., EPA arrived at Minntac's Administration building to initiate the file review. Minntac provided most of the documents EPA requested the day before. About 9:30 a.m., the inspection team had a conference call with technical staff from the corporate office to address inquiries regarding water balance and Line 3 scrubber blowdown mass balance calculations (for sulfates and hardness). These calculations are required under the current NPDES permit (tailing basin). From the corporate office, Mr. Matthew Caprarese and Ms. Lisa A. Zemba (attorney) participated. Also, Mr. Mike Johnson from Liesch Associates, Inc., a consultant for US Steel participated.

EPA had a working lunch, while continuing to review documents, and asking the facility questions. EPA was concerned about the process diagrams attached to the January 1992 NPDES permit application. Mr. Vargas raised the concern about the dates of these diagrams (1992, 1993, and 1994), as related to the date of the permit application. After a brief moment, Mr. Hacker indicated that such diagrams were there for comparison purposes.

DOCUMENT REVIEW

The documents review occurred during the last day of the inspection. Each inspector reviewed specific documents, as follows:

Jenny L. Davison and Thomas Mendez reviewed Minntac's self monitoring records for the tailing basin, including DMRs for the last 16 months. The recorded sulfate concentrations for Outfall SD001 are:

DMR date	Sulfate concentration (mg/L)
April 2012	1,020
March 2012	935
February 2012	956
January 2012	938
December 2011	973
November 2011	923
October 2011	914
September 2011	929
August 2011	990
July 2011	961
June 2011	980
May 2011	968
April 2011	996
March 2011	973
February 2011	1,020
January 2011	984

They further evaluated the lab sheets for February 2012 and April 2012 for Outfall SD001. Samples were taken on 2/1/2012, 2/15/2012, 4/4/2012, and 4/18/2012. Chain of custody (COC) sheets for these samples are kept in the onsite files. Samples were analyzed for total suspended solids (TSS), oil and grease, and sulfates. All parameters were included on the COC sheets and matched up to the reported values for the DMRs for the corresponding period. An onsite log book showed pH, conductivity and flow recorded for the samples.

Jonathan Moody reviewed documents associated with Minntac's water balance calculations. Minntac's water flow diagram depicts all the flow estimates around the facility (See Attachment 6). During the inspection, Minntac provided a detailed explanation of how these estimates were calculated. EPA observed the following:

- The "void loss" at the tailing basin is estimated as 1,147 gallons per minute (gpm), which represents the volume reduction the basin experiences due to the deposition of tailings. The flow is calculated based on the annual reporting of tailing deposited in the basin while accounting for the percentage of tailings volume which is above or below the waterline. Minntac has reported "an average of 15 million long tons of dry fine tailings and 7 million long tons of dry coarse tailings" disposed of each year in the basin since at least 1986. If this flow is consistent with the deposition of tailing basin, then it has remained constant for the last 16 years.

- The onsite sewage treatment plant also discharges to the tailing basin. This flow was not included on the water flow diagram.

I reviewed other permit-related documents, and documents associated with the wet scrubbing system. In or about July 2006, Minntac installed Line 3 scrubber to comply with air regulations.

Minntac monitors both sulfate and hardness mass loadings by determining the "no-net-increase" to the tailing basin, as follows:

- The "no-net-increase" in sulfate mass loading to the tailing basin is determined by measuring sulfate concentration and flow rate in and out of the scrubbing system. The mass of sulfate leaving the scrubber system must not be greater than the mass of sulfate entering the scrubber system. EPA observed that Minntac was not able to maintain a sulfate mass balance in most cases. In addition, the actual sulfate discharges reported by Minntac has been between 900 to up to 1020 mg/L. For Class 4A waters that are used to grow wild rice, the water quality standard (WQS) for sulfates is 10 mg/L.

- The "no-net-increase" in hardness is determined by measuring the hardness [(calcium plus magnesium; (Ca + Mg)] and flow rate, and then comparing it with the excess hydroxide ion [OH^-] concentration obtained from pH measurements. The number of moles of excess [OH^-] must be equal to or greater than the number of excess (Ca + Mg) in the thickener overflow stream. EPA observed that Minntac was not able to maintain this hardness mass balance, reporting a significant net increase (See Attachment 7).

Other documents reviewed were stamped "U.S. Steel Confidential Business Information." These documents were treated as such.

CLOSING CONFERENCE

The closing conference was held on the afternoon of May 23rd. After the closing conference, the inspection team went to the tailing basin to closely observe the basin cells within the clear pool area and the pump station (Pictures 55 - 61). The inspection team also stopped at the onsite reservoir (Pictures 62 - 65). After this, the inspection ended, and the EPA team left the facility.

LIST OF ATTACHMENTS

1. Maps
2. DMR data
3. 308 Request
4. Mine Permit
5. Tailing Basin Permit
6. Water Flow Diagram (Facility claimed CBI)
7. 2011 Annual Report
8. Photo Log (Facility claimed CBI)